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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/786,499	03/02/2001	Michael Hobson	GJE-0004	1435

23413   7590   04/24/2009
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EXAMINER
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ART UNIT	PAPER NUMBER
2625	

NOTIFICATION DATE	DELIVERY MODE
04/24/2009	ELECTRONIC

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UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

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Ex parte MICHAEL HOBSON and ANTHONY LASENBY

_____

Appeal 2008-5807
Application 09/786,499[1]
Technology Center 2600

_____

Decided:[2] April 22, 2009

_____

Before JOHN A. JEFFERY, MARC S. HOFF, and CARLA M. KRIVAK,
Administrative Patent Judges.

HOFF, *Administrative Patent Judge.*

DECISION ON APPEAL

_____

[1] The real party in interest is Wallac, OY.
[2] The two-month time period for filing an appeal or commencing a civil
action, as recited in 37 C.F.R. § 1.304, begins to run from the decided date
shown on this page of the decision. The time period does not run from the
Mail Date (paper delivery) or Notification Date (electronic delivery).

STATEMENT OF CASE

Appellants appeal under 35 U.S.C. § 134 from a Final Rejection of claims 1-3 and 5-16.[3] We have jurisdiction under 35 U.S.C. § 6(b).

We affirm.

Appellants' invention relates to a method of reconstructing a signal from a given set of data. The method includes altering a coordinate basis of the data to produce a prediction function having a reduced set of variables, performing a Bayesian reconstruction to produce a reconstruction signal, and converting the reconstruction signal back into the original coordinate basis to generate a signal (Abstract).

Claim 1 is exemplary:

1.   A method of reconstructing a previously produced signal from a given set of data, the set of data characterized by a first prediction function representing a predictable effect of an apparatus on the previously produced signal, and a noise function representing unpredictable noise contributed to the previously produced signal, the method comprising the steps of:

altering an original coordinate basis of the set of data to produce at least one other coordinate basis, the at least one other coordinate basis having a plurality of spaces with a lower dimensionality than a space within the original coordinate basis, the set of data in the at least one other coordinate basis represented by a second prediction function of the previously produced signal in the at least one other coordinate basis;

performing a Bayesian reconstruction utilizing the second prediction function to produce a reconstruction signal, the Bayesian reconstruction utilizing a maximum entropy method capable of operation on positive, negative, and complex values; and

converting the reconstruction signal back into the original coordinate basis to generate the previously produced signal.

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[3] Claim 4 has been cancelled.

The prior art relied upon by the Examiner in rejecting the claims on appeal is:

Hofstein	US 4,099,179	Jul. 4, 1978
Bahorich	US 5,226,019	Jul. 6, 1993
Larson	US 5,252,922	Oct. 12, 1993
Knaell	US 5,394,151	Feb. 28, 1995
Spencer	US 5,535,291	Jul. 9, 1996
Clarke	US 5,799,100	Aug. 25, 1998

Claims 1-3 and 5-16 stand rejected under 35 U.S.C. § 101 as being directed to non-statutory subject matter.

Claims 1, 2, 5-8, and 10 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Knaell in view of Spencer.

Claims 3 and 9 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Knaell in view of Spencer and Clarke.

Claims 11, 12, and 15 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Knaell in view of Spencer and Hofstein.

Claims 13 and 16 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Knaell in view of Spencer, Hofstein, and Bahorich.

Claim 14 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Knaell in view of Spencer and Larson.

Throughout this decision, we make reference to the Appeal Brief ("Br.," filed August 24, 2007) and the Examiner's Answer ("Ans.," mailed November 1, 2007) for their respective details.

ISSUES

With regard to the § 101 rejection, Appellants argue that that the claimed invention is directed to statutory subject matter because the claimed method of reconstructing a previously produced signal has a practical application, and because the claimed method produces a useful, concrete, and tangible result (Br. 4). According to the Examiner, because the claims are directed to a mathematical algorithm performed internally upon data to produce other data, the claimed invention does not accomplish a practical application nor produce a useful, concrete, and tangible result (Ans. 11).

With regard to the pending § 103 rejections, Appellants argue that Knaell fails to teach altering an original coordinate basis to produce at least one other coordinate basis having a plurality of spaces with a lower dimensionality. Appellants allege that Knaell in fact teaches obtaining three-dimensional (3D) data by repositioning a radar antenna that obtains two-dimensional (2D) data (Br. 6) – thus producing a coordinate basis with a higher dimensionality, rather than a lower one. The Examiner posits that Knaell teaches obtaining two-dimensional data from the three-dimensional coordinates of the object being measured by Knaell's radar system, thus meeting the claim requirement for a coordinate basis having lower dimensionality (Ans. 12).

The respective contentions of Appellants and the Examiner thus present us with the following issues:

1. Have Appellants shown that the Examiner erred in concluding that the claimed method of reconstructing a previously produced signal constitutes non-statutory subject matter under § 101?

     2.   Have Appellants shown that the Examiner erred in finding that Knaell teaches altering an original coordinate basis of a set of data to produce at least one other coordinate basis having a plurality of spaces with a lower dimensionality than a space within the original coordinate basis, as required by claim 1?

<div align="center">FINDINGS OF FACT</div>

     The following Findings of Fact (FF) are shown by a preponderance of the evidence.

<div align="center">*The Invention*</div>

     1.   According to Appellants, the invention concerns a method of reconstructing a signal from a given set of data. The method includes altering a coordinate basis of the data to produce a prediction function having a reduced set of variables, performing a Bayesian reconstruction to produce a reconstruction signal, and converting the reconstruction signal back into the original coordinate basis to generate a signal (Abstract).

<div align="center">*Knaell*</div>

     2.   Knaell teaches acquiring useful three-dimensional radar images from an aircraft which travels in a curvilinear path (Abstract).

     3.   The set of data from which Knaell begins its processing is obtained by the synthetic aperture radar (SAR) antenna, which performs a plurality of 2D image capture operations at specific sample points (col. 4, l. 64 – col. 5, l. 10).

     4.   Knaell teaches constructing a three-dimensional image from the captured two-dimensional images (col. 9, ll. 6-22).

<div align="center">5</div>

Spencer

5.   Spencer teaches image enhancement and resolution via a combination of image magnification and/or image zoom, superresolution processing techniques, and a parallel (SIMD) machine implementation, that is suitable for machine processing pattern recognition systems (Abstract).

Hofstein

6.   Hofstein teaches a method and system of electronic image storage and display. The incoming signal is stored in the memory of a scan converter and the stored image is scanned and displayed on a conventional television raster scan display (Abstract).

Bahorich

7.   Bahorich teaches a method of stratigraphic analysis of geophysical data (Abstract).

Clarke

8.   Clarke teaches a computer-assisted method and apparatus for the enhancement and detection of suspicious regions in digital X-ray images (Abstract).

PRINCIPLES OF LAW

> The Supreme Court . . . has enunciated a definitive test to
> determine whether a process claim is tailored narrowly enough
> to encompass only a particular application of a fundamental
> principle rather than to pre-empt the principle itself. A claimed
> process is surely patent-eligible under § 101 if: (1) it is tied to a
> particular machine or apparatus, or (2) it transforms a particular
> article into a different state or thing. *See Benson*, 409 U.S. at
> 70, 93 S.Ct. 253 ("Transformation and reduction of an article 'to
> a different state or thing' is the clue to the patentability of a
> process claim that does not include particular machines.");
> *Diehr*, 450 U.S. at 192, 101 S.Ct. 1048 (holding that use of
> mathematical formula in process "transforming or reducing an

article to a different state or thing" constitutes patent-eligible subject matter); *see also Flook*, 437 U.S. at 589 n.9, 98 S.Ct. 2522 ("An argument can be made [that the Supreme] Court has only recognized a process as within the statutory definition when it either was tied to a particular apparatus or operated to change materials to a 'different state or thing'"); *Cochrane v. Deener*, 94 U.S. 780, 788 (1876) ("A process is . . . an act, or a series of acts, performed upon the subject-matter to be transformed and reduced to a different state or thing.").

In re Bilski, 545 F.3d 943, 952 (Fed. Cir. 2008) (footnote omitted).

The machine-or-transformation test is a two-branched inquiry; an applicant may show that a process claim satisfies § 101 either by showing that his claim is tied to a particular machine, or by showing that his claim transforms an article. *See Benson*, 409 U.S. at 70, 93 S.Ct. 253. Certain considerations are applicable to analysis under either branch. First, as illustrated by *Benson* and discussed below, the use of a specific machine or transformation of an article must impose meaningful limits on the claim's scope to impart patent-eligibility. *See Benson*, 409 U.S. at 71-72, 93 S.Ct. 253. Second, the involvement of the machine or transformation in the claimed process must not merely be insignificant extra-solution activity. *See Flook*, 437 U.S. at 590, 98 S.Ct. 2522.

Id., 545 F.3d at 961-62.

Section 103 forbids issuance of a patent when "the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains."

KSR Int'l Co. v. Teleflex Inc., 127 S. Ct. 1727, 1734 (2007). The question of obviousness is resolved on the basis of underlying factual determinations including (1) the scope and content of the prior art, (2) any differences between the claimed subject matter and the prior art, (3) the level of skill in

the art, and (4) where in evidence, so-called secondary considerations. *Graham v. John Deere Co.*, 383 U.S. 1, 17-18 (1966). *See also KSR*, 127 S. Ct. at 1734 ("While the sequence of these questions might be reordered in any particular case, the [*Graham*] factors continue to define the inquiry that controls.")

In *KSR*, the Supreme Court emphasized "the need for caution in granting a patent based on the combination of elements found in the prior art," *id.* at 1739, and discussed circumstances in which a patent might be determined to be obvious. In particular, the Supreme Court emphasized that "the principles laid down in *Graham* reaffirmed the 'functional approach' of *Hotchkiss*, 11 How. 248." *KSR,* 127 S. Ct. at 1739 (citing *Graham v. John Deere Co.*, 383 U.S. 1, 12 (1966) (emphasis added)), and reaffirmed principles based on its precedent that "[t]he combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results." *Id.* The Court explained:

> When a work is available in one field of endeavor, design incentives and other market forces can prompt variations of it, either in the same field or a different one. If a person of ordinary skill can implement a predictable variation, § 103 likely bars its patentability. For the same reason, if a technique has been used to improve one device, and a person of ordinary skill in the art would recognize that it would improve similar devices in the same way, using the technique is obvious unless its actual application is beyond his or her skill.

Id. at 1740. The operative question in this "functional approach" is thus "whether the improvement is more than the predictable use of prior art elements according to their established functions." *Id.*

ANALYSIS

§ 101 REJECTION

We select claim 1 as representative of this group, pursuant to our authority under 37 C.F.R. § 41.37(c)(1)(vii).

Appellants assert that the claimed invention is directed to patent-eligible subject matter because transformation of a signal into a reconstructed signal has practical application (Br. 5). Appellants further argue that the claimed signal reconstruction is useful, concrete, and tangible, because it is a real-world result with a practical application such as de-blurring of a microscope image (*id.*).

As recently articulated by the Federal Circuit, the test for subject-matter eligibility of a process is a two-branched inquiry. An applicant may show that a process claim satisfies § 101 either by showing that his claim is tied to a particular machine, or by showing that his claim transforms an article. *Bilski*, 545 F.3d at 961-62. With regard to the claims at issue in this appeal, it is clear that the invention contemplated by claim 1 is not tied to a particular machine. Claim 1 contains no limitations directed to any machine whatsoever. Further, claim 1 does not call for the transformation of a physical article: the claim contains no limitations directed to any operation on any physical article.

This determination does not end the inquiry, however. The *Bilski* court allowed for the possibility that the manipulation of electronic signals or data could be considered "transformation of an article." With reference to the claimed invention at issue in *In re Abele,* 684 F.2d 902, the *Bilski* court indicated that a broad independent claim reciting a process of graphically displaying variances of data from average values was held unpatentable

because the claim did not specify any particular type or nature of data, nor did it specify how or from where the data was obtained or what the data represented. *See Bilski*, 545 F.3d at 962. In contrast, a dependent claim specifying that the data to be displayed "is X-ray attenuation data produced in a two dimensional field by a computed tomography scanner"[4] was held to be drawn to patent-eligible subject matter because the data clearly represented physical and tangible objects; the transformation of that raw data into a particular visual depiction of a physical object on a display was sufficient to render that more narrowly-claimed process patent-eligible. *Bilski*, 545 F.3d at 962-63. *Bilski* held that there is no danger of pre-emption of fundamental principles "[s]o long as the claimed process is limited to a practical application of a fundamental principle to transform specific data, and the claim is limited to a visual depiction that represents specific physical objects or substances." *Bilski*, 545 F.3d at 963.

Applying this "exception" to the rule requiring transformation of an article to Appellants' claim 1, we find that claim 1 does not specify any particular type or nature of data, nor does it specify where the data came from or what it represents. We further find that the claimed process does not transform specific data, and that the claim is not limited to a visual depiction representing physical objects or substances.

Finally, with respect to Appellants' contention that the invention of claim 1 produces a useful, concrete, and tangible result, *Bilski* holds that inquiry into whether a process produces a useful, concrete, and tangible result is insufficient to determine whether a claim is patent-eligible under

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[4] *Abele*, 684 F.2d at 908-09.

§ 101, and reaffirms the Supreme Court's machine-or-transformation test. *Bilski*, 545 F.3d at 561-62.

We therefore conclude that the invention of claim 1 is not tied to a particular machine, nor does it transform an article. As a result, we conclude that claim 1 is directed to nonstatutory subject matter.

Because Appellants have not shown error in the Examiner's rejection of claim 1, we will sustain the rejection of claims 1-3 and 5-16 under 35 U.S.C. § 101.

SECTION 103 REJECTION OF CLAIMS 1, 2, 5-8, AND 10

Appellants argue that the Examiner has not established a prima facie case of obviousness because Knaell fails to teach altering an original coordinate basis of a set of data to produce at least one other coordinate basis, the coordinate basis having a plurality of spaces with a lower dimensionality than a space within the original coordinate basis (Br. 5). Appellants characterize Knaell as producing a three-dimensional (3D) image by repositioning a radar antenna that obtains two-dimensional (2D) data (Br. 6). According to Appellants, Knaell thus teaches obtaining data of a *higher* dimensionality than the original data, rather than data of a lower dimensionality (Br. 6).

The Examiner asserts that the claims are correctly rejected because Knaell teaches "altering an original coordinate basis of the object" to produce at least one other coordinate basis having a lower dimensionality, in that "the original coordinate basis is a three-dimensional coordinate basis since the object that is measured by the synthetic aperture radar (SAR) system is a three-dimensional object" (Ans. 12). According to the Examiner, that 3D coordinate basis is altered to a 2D coordinate basis via the SAR

image capturing, and ultimately a 3D image is reconstructed from that 2D data (*id.*).

In rejecting the claims, however, the Examiner misquotes claim 1, in that claim 1 does not recite "altering an original coordinate basis of the object," as the Examiner states (Ans. 12), but rather "altering an original coordinate basis of the *set of data.*" The Examiner admits that the set of data from which Knaell begins its processing is obtained by the SAR antenna, which performs a plurality of 2D image capture operations at specific sample points (FF 3). A three-dimensional image is then constructed from the captured two-dimensional images (FF 4). We agree with Appellants that Knaell therefore teaches obtaining data of a higher dimensionality, rather than a lower dimensionality as claimed.

As such, we find that the Examiner erred in finding that the combination of Knaell and Spencer establishes a prima facie case of obviousness with respect to claim 1, and we will not sustain the rejection of claims 1, 2, 5-8, and 10 under 35 U.S.C. § 103.

SECTION 103 REJECTION OF CLAIMS 3 AND 9

We reverse *supra* the rejection of parent claim 1 under 35 U.S.C. § 103 as unpatentable over Knaell in view of Spencer. Appellants present no separate argument for the patentability of dependent claims 3 and 9. We have reviewed Clarke, and find that it does not remedy the deficiencies of Knaell which we have noted. We therefore reverse the rejection of claims 3 and 9 under 35 U.S.C. § 103 as unpatentable over Knaell in view of Spencer and Clarke for the same reasons expressed with respect to claim 1.

SECTION 103 REJECTION OF CLAIMS 11, 12, AND 15

We reverse *supra* the rejection of parent claim 1 under 35 U.S.C.

§ 103 as unpatentable over Knaell in view of Spencer. Appellants present no separate argument for the patentability of dependent claims 11, 12, and 15. We have reviewed Hofstein, and find that it does not remedy the deficiencies of Knaell which we have noted. We therefore reverse the rejection of claims 11, 12, and 15 under 35 U.S.C. § 103 as unpatentable over Knaell in view of Spencer and Hofstein for the same reasons expressed with respect to claim 1.

SECTION 103 REJECTION OF CLAIMS 13 AND 16

We reverse *supra* the rejection of parent claim 1 under 35 U.S.C. § 103 as unpatentable over Knaell in view of Spencer. Appellants present no separate argument for the patentability of dependent claims 13 and 16. We have reviewed Hofstein and Bahorich, and find that they do not remedy the deficiencies of Knaell which we have noted. We therefore reverse the rejection of claims 13 and 16 under 35 U.S.C. § 103 as unpatentable over Knaell in view of Spencer, Hofstein, and Bahorich for the same reasons expressed with respect to claim 1.

SECTION 103 REJECTION OF CLAIM 14

We reverse *supra* the rejection of parent claim 1 under 35 U.S.C. § 103 as unpatentable over Knaell in view of Spencer. Appellants present no separate argument for the patentability of dependent claim 14. We have reviewed Larson, and find that it does not remedy the deficiencies of Knaell which we have noted. We therefore reverse the rejection of claim 14 under 35 U.S.C. § 103 as unpatentable over Knaell in view of Spencer and Larson for the same reasons expressed with respect to claim 1.

CONCLUSIONS OF LAW

1.   Appellants have not shown that the Examiner erred in concluding that the claimed method of reconstructing a previously produced signal constitutes non-statutory subject matter under § 101.

2.   Appellants have shown that the Examiner erred in finding that Knaell teaches altering an original coordinate basis of a set of data to produce at least one other coordinate basis having a plurality of spaces with a lower dimensionality than a space within the original coordinate basis, as required by claim 1.

ORDER

The Examiner's rejection of claims 1-3 and 5-16 under 35 U.S.C. § 101 is affirmed. The Examiner's rejection of claims 1-3 and 5-16 under 35 U.S.C. § 103(a), using various combinations of references, is reversed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1)(iv).

<u>AFFIRMED</u>

ELD

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